Motion and Forces; Newton's Laws and Model Rockets

I Rationale:

This lesson sequence will provide students with information about Newton's Laws of Motion with practice activities and applications to the flight of model rockets using a simulation program.

II Procedures:

1. Recommended Activities
    - View the Beginners Guide to Rockets, here: http://exploration.grc.nasa.gov/education/rocket/bgmr.html
    - Learn about Newton's Laws of Motion, here: http://exploration.grc.nasa.gov/education/rocket/newton.html
    - Complete these activities:
        1. Fundamental Terminology: Grade 10-12 (http://exploration.grc.nasa.gov/education/rocket/Lessons/termsP_act.html)
        2. Rocket Propulsion Activity: Grade 9-10 (http://exploration.grc.nasa.gov/education/rocket/Lessons/propulsionS_act.html)
        3. RocketModeler II Simulator (http://exploration.grc.nasa.gov/education/rocket/rktsim.html)

III Content Standards Addressed:

National Science Education Standards:

- **B.2.1** – The motion of an object can be described by its position, direction of motion, and speed
- **B.2.2** – An object that is not being subjected to a force will continue to move at a constant speed and in a straight line
- **B.2.3** – Unbalanced forces will cause changes in the speed or direction of an object's motion
- **B.3.1** – Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways

National Council of Teachers of Mathematics:

- **A.1.1** – Work flexibly with fractions, percents, and decimals to solve problems
- **A.2.1** – Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers
- **B.2.1** – Develop an initial conceptual understanding of different uses of variables
- **B.2.4** – Recognize and generate equivalent forms for simple algebraic expressions and solve linear equations
- **C.3.1** – Describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling
- **C.4.5** – Recognize and apply geometric ideas and relationships in areas outside the mathematics classroom
- **D.1.1** – Understand both metric and customary systems of measurement

National Education Technology Standards:

- **A.1.2** – Students are proficient in the use of technology

- **A.6.1** – Students use technology resources for solving problems and making informed decisions
- **B.8** – Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems
- **B.9** – Demonstrate an understanding of concepts underlying hardware, software, and connectivity, and of practical applications to learning and problem solving